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KING SALMON MARKING EXPERIMENT AT KLAMATH RIVER, 1919.

By W. L. SCOFIELD.

Source of Eggs.

The Chinook or king salmon used in this experiment were from eggs taken by Mr. Hurby of the United States Bureau of Fisheries at the substation on Mill Creek, Tehama County, California, near the town of Tehama about twelve miles south of Red Bluff. Mill Creek is a tributary of the Sacramento River. The eggs were taken about the latter part of November, 1918.

Shipping.

The eyed eggs were shipped in one shipment of 1,153,000 eggs. Though originally billed to the Mount Shasta Hatchery, they were not unloaded but shipped immediately to the new Fall Creek Hatchery on Fall Creek near Copco, Siskiyou County, about sixteen miles from

Hornbrook. The eggs were received at the Fall Creek Hatchery February 13, 1919.

Hatching.

The eggs were hatched at Fall Creek Hatchery from the middle to the end of February, 1919. About July 1, 1919, 25,000 of these small king salmon were placed in the cement-sided pond at Fall Creek Hatchery and the others were liberated in Fall Creek, which is a tributary of the Klamath River, entering just below the California-Oregon Power Company dam at Copco. The hatchery is about a mile up Fall Creek from its mouth.

Mark Used.

The *adipose* and *right ventral* fins were removed by clipping off close to the body with a pair of manicurists' cuticle nippers. The marking, begun November 3 and completed November 15, 1919, was done by L. Phillips of the Department of Fish Culture and W. L. Scofield of the Department of Commercial Fisheries of the Fish and Game Commission of California.

Variation in Size.

Although from the same brood, hatchery practice and rearing pond, there was great variation in the size of the yearlings at the time of marking, the extremes in length being from $1\frac{3}{16}$ to 5 inches, measured from the tip of the snout to the tip of the central rays of the caudal fin. The small fish, roughly those under two inches in length, were not marked but sorted out as the marking proceeded. These small fish were liberated every day or two.

Counting and Separation.

As 250,000 fish had been counted into the rearing pond, no count was made of unmarked fish while marking. The marked fish were carefully counted each day. Mr. Phillips kept tally of his work while marking. Mr. Scofield counted his work at the end of the half day. In each case at the end of the day the fish marked by each person were placed in a separate trough.

Liberations.

The first fish marked were held to the end of the fifth day in the trough to determine the effect of rough handling. As no injury showed in the fish, the first five days marking was liberated at the end of the fifth day and from then on the marked fish were liberated each day or two. All liberations were made in Fall Creek. November 14 the rearing pond was emptied, thus liberating all the unmarked fish of the 250,000 except a few held in the hatchery troughs. The following day all remaining unmarked fish were liberated.

Control.

In order to determine the possible percentage of fin regeneration, a sample of each half day's marking was retained as a control to be held in the hatchery trough. The control from each person's marking was

held in a separate trough. Control fish were obtained by dipping out a few fish with a net and counting out fifty or so without conscious selection. Great care was used in this respect so that the control would be exactly representative of the size classes of marked fish in order that the control might be used for possible future study. The control remained two months in the hatchery troughs from the time of marking until the middle of January, 1920. The control fish were then bottled in formalin and shipped to Professor J. O. Snyder of Stanford University, being received by him January 19, 1920. Through an oversight when bottling the control at the hatchery, the fish marked by Phillips and those marked by Scofield were not kept separate, but since the percentage of regeneration has been found to be almost negligible this attempt to determine the regeneration percentage for each person's marking was scarcely necessary. Roughly, 100 of the control marked by Scofield were shipped to Professor Snyder for his study very soon after the marking and received by him December 1, 1919. Of the 25,850 fish marked 850, or roughly 3 per cent of the total were retained as control, thus leaving an even 25,000 marked fish to be liberated.

Percentage of Fin Regeneration.

To determine the percentage of fins which might be expected to regenerate, the control was examined by W. L. Scofield in February, 1920, with the help of Professor Snyder and Mr. Willis Rich of the United States Bureau of Fisheries. Of the 573 specimens examined but 8 or 1.4 per cent showed signs of possible regeneration and in several of these cases the resulting ventral fin would probably be so deformed as to be recognizable as a mark when found with a missing adipose fin. In no case had the adipose fin shown any sign of regenerating.

Injury from Marking.

But one death was noted among the marked fish soon after marking and none among the control from November 3 to 15, 1919. A report in December from the hatchery stated that the control was apparently perfectly normal and healthy with very few deaths. A few fish were stunned by the rough handling while being marked but when returned to the water would swim off after about one minute and show no further signs of discomfort.

Summary.

Of 1,153,000 king salmon eggs taken in November, 1918, from Mill Creek of the Sacramento, and hatched at Fall Creek Hatchery on the Klamath River in February, 1919, 903,000 were liberated in the Klamath about July 1, 1919, and 250,000 were held in a rearing pond. In November, 1919, the 250,000 from the rearing pond were liberated in the Klamath River after 25,000 of them had been marked by removing *adipose* and *right ventral* fins.

King Salmon Marked at Fall Creek Hatchery.			
Date		Number of fish marked	
		By Scofield	By Phillips
1919—November 3	-----	243	} 1,172
November 4	-----	713	
November 5	-----	595	1,046
November 6	-----	760	1,106
November 7	-----	1,050	1,425
November 8	-----	800	750
November 9	-----	925	1,250
November 10	-----	1,100	1,000
November 11	-----	1,100	1,200
November 12	-----	1,350	1,800
November 13	-----	1,550	1,650
November 14	-----	1,110	1,500
November 15	-----	330	325
Totals	-----	11,626	14,224
Total marked	-----		25,850

Control Counted Out from the Total.		
Date	From Scofield marking	From Phillips marking
1919—November 6	50	50
November 9	50	50
November 10	100	100
November 12	125	125
November 13	50	50
November 14	25	25
November 15	25	25
Totals	425	425
Total control		850

Number of Marked Fish Liberated in Fall Creek in November, 1919.	
Date	Number
1919—November 7	5,585
November 8	1,425
November 9	4,675
November 10	1,900
November 12	5,200
November 13	3,100
November 14	2,560
November 15	605
Total	25,000

GAME IN THE SAN JOAQUIN VALLEY IN 1853.*

A Little Journal of Incidents Whilst on a Surveying Party with von Schmidt, Deputy Surveyor under Colonel Jack Hays, in the Fall of 1853, on the Tulare Plains.

By COLONEL ANDREW J. GRAYSON.

Meeting my friend von Schmidt, a German by birth but raised in the United States, and at that time deputy surveyor, one day as I was walking down one of the streets of San Francisco, and whom I hadn't seen for a long time, I shook him cordially by the hand, when he told me he was just making preparations for a long trip to the Tulare plains and lakes to survey the Standard lines (government survey), and as I had never been in this portion of California, and having heard oft of the great quantities of game in this region of the country interesting to the

*Between the years 1846 and 1869 there lived in California a naturalist and artist of so great attainment that he became known as the "Audubon of the Pacific." This naturalist was Colonel A. J. Grayson. Born in Louisiana, on the banks of the picturesque Ouachita River, hemmed in by pine forests and cane brakes, Grayson spent most of his boyhood days rambling in the woods or along the banks of the river. While still a child he manifested great talent in the drawing and painting of birds and the wild life scenes with which he was so intimately acquainted; but this was most vehemently discouraged by his parents and he was sent away to school to learn to be more practical. After finishing college young Grayson made an attempt at business, but he had no love for the drudgery of mercantile pursuits. He found no pleasure but in the study of nature, so he gave it up and determined to go to California where his longing for new objects of study in nature's unexplored recesses might be satisfied.

And so it was that about the middle of April, 1846, he found himself at the head of a caravan composed of many well known pioneers setting out on the long overland journey to the Pacific. But as they traveled westward some branched off

adventurer, from the fact of its never having been but little explored save by the few wild Indians that live about the lakes, I at once proposed accompanying him on this interesting trip. Von Schmidt was glad to have me go, so I made up my mind to do so, for I hadn't had a hunt for a long time.

So on the evening of the sixteenth of September, 1853, we took the good little steamer "Sophia" from San Francisco bound for Stockton. At Stockton we secured wagon, mules and camping equipment and on September 18 our party started on their journey.

At noon of the second day out we reached the Stanislaus River—at Heath and Emery's ferry—where we had our lunch, forded the river and took the Mariposa road. The day was intensely warm and the road heavy and dusty, as it wound through the low hills, sparsely covered with oak and brush. After a few miles we saw a large track of a grizzly which seemed to have just crossed the road. After tracking him through the woods for a while I came to the conclusion that the old Growler had made tracks to the river to quench his thirst and cool his hide, for the day was melting hot and the hills around parched. I couldn't conceive what brought him so far from water at that time of day—and such a day!

We made an uneventful camp that night and by sunrise the next day (September 20) were on our way. We crossed the Tuolumne River at Dickinson's ferry and camped on a creek that night. On September 21 we reached the Merced River at "Snelings," where we camped and caught our first fish and killed our first game—a few quail. The fish were full of fine bones—the same kind I have seen in all the fresh water streams in California—and a very poor fish to eat.

Leaving the river about six miles farther up, we proceeded toward the foothills. As yet we had seen no game larger than quail, but as we advanced towards the wilds the country became more interesting. On September 26 we reached old Stearns' cabin, where we camped. Here I shot quail and doves and one of the boys killed a hare. On the next day we proceeded toward the Chowchilla River, where von Schmidt received instructions from the Surveyor General and commenced his surveying work. Here I went out hunting in the low hills for antelope and came across a herd of them, but they were so wild I could not get near enough to shoot one. Later we camped on the Fresno, then a dry bed, but with a few water holes. Here we saw a large band of wild horses—probably fifty in number—and they went snorting and charging

in different courses, notably the Donner party; others fell away; and finally Colonel Grayson, with his wife and child and one horse, completed the journey alone.

Almost needless to say, Colonel Grayson, like almost every one else in those early days of California, went to the "diggings" and was so far successful as to be considered one of the wealthy men of San Francisco at one time. His attempts at mercantile pursuits, however, proved failures, as before. The wilds called to him and he determined to renounce business again and adopt the life of a trapper, which would afford him opportunities for the study of ornithology. One of his best known works is his "Birds of the Pacific Slope," which is profusely illustrated with colored drawings, the work of his own hand. So fine were some of these drawings that the State Fair at Sacramento awarded him a special premium "for superior drawings of native birds of California, exhibited at the Fair, 1855."

This noted artist and naturalist, in his various wanderings for the purpose of studying wild life, accepted in 1853 an invitation from a friend to accompany a surveying party to the plains of Tulare County. The accompanying extracts, slightly revised, are from a diary kept by Grayson which refer to the abundance of game prevalent in that region at the time of the trip. The handwritten journal is deposited in the Bancroft Library, of the University of California, and acknowledgement is here made of the courtesy of the Library in allowing its publication.—Editor.

in a circle around us, and then away over the plains. Here also I saw numbers of antelope, but they were too wild to approach.

On September 30 we forded the San Joaquin at Beals' Indian Farm, where we caught salmon and other fish, which appeared in great quantities. Some five or six miles up the river we saw some whooping cranes, a few ducks, heard a mocking bird, and saw antelope. I shot a duck and a hare.

On October 3 and 4 we passed over rolling land, running due north to the Fourth Standard and passing Kings River Slough. On these days we saw great numbers of antelope and wild horses and also a silver grey fox—the first one I had seen this side of the Rockies. At Kings River Slough we killed some bitterns, also saw ducks, black curlews and various other water birds. Fishing also was good. At this slough also we met Indians, and one of them undertook to conduct us on a hunt for elk. With our Indian guide we went westerly toward the Tularies, between Kings River Slough and Kings River. These lands were literally perforated by gophers, moles and other underground inhabitants, and the air was infested with mosquitoes. On this trip we saw great quantities of quail, also the tracks of a grizzly, but found nothing but the *signs* of elk. Our Indian guide, who was on foot, while we rode horseback, became tired out and we returned to camp on the slough.

Von Schmidt continued surveying operations along the Kings, during which time we saw large herds of antelope. Then we proceeded to the main branch of the Kaweah River, to Woodville, the county seat of Tulare County. All branches of the Kaweah abound with fish, and wood ducks were plentiful. Bear signs were everywhere and we killed a cub while in the Kaweah country.

Later, leaving the Kaweah country, we continued to Tula Swamp, where we found signs of elk, but no elk were actually seen. At Tula Slough Creek we found quantities of fish, and I saw for the first time here a roadrunner. Here we killed a few hares, the only game seen.

On October 16 we began our journey over stretches of alkaline desert, under a sweltering sun, and with mirages mocking us in every direction, toward the great Tulare Lake. We reached this lake early in the evening, in time to kill quantities of ducks, snipe, geese and black curlew before dark. We also killed two antelope and a number of hare. We feasted that night after our desert travels. We found all kinds of waterfowl, antelope and hare in abundance around Tulare Lake. And it was here that I killed our first elk. We had gone on a little excursion from the lake (exactly on the line of the Seventh Standard Parallel, about three miles distant), when I saw a herd of four large buck elk. My first shot brought one down, and the others did not seem frightened nor run, and I am sure we could have shot more, but we did not need the meat.

The Indians on Tulare Lake were greatly perturbed over our visit. They feared that we might contemplate squatting on their land. And they were pleased when we told them (through a Spanish interpreter) that we had no such intentions. In fact, the whole country we had traveled over since we left the Four Creeks (Kaweah River) to Tulare Lake is totally unfit for any purpose and can never be settled by anybody but hunters or Indians. And we assured the Indians they need not fear squatters, as no white man would ever want their land.

On October 31 our surveying operations brought us to the main Kern River. Here we found any quantity of elk and waterfowl, and such a place for hunters I never saw! The mallard duck abounded, but of every description of waterfowl my pen could scarcely describe the numbers, or the excitement they would create in the breast of a sportsman. Your ears are confused with the many sounds—the quacking of the mallard, the soft and delicate whistle of the baldpate and teal, the underground-like notes of the rail or marsh hen, the flute-like notes of the wild goose and brant, the wild ranting of the heron, not to forget the bugle-like notes of the whooping crane and swan and a thousand other birds mingling their songs together—creates that indescribable sensation of pleasure that can only be felt by one fond of nature in its wildest and most beautiful form.

We crossed the Kern and went on to Lake Buena Vista. We found the immediate vicinity of this beautiful lake on the side of our approach (from the west) devoid of life, save for the little ground squirrel and the little desert sparrow. Later, however, we found great quantities of white geese and other waterfowl of every description on the southeast shores of Lake Buena Vista. In fact, so great was the number that out of ten shots fired one hundred and eighty-five fowl were killed.

It was here at Lake Buena Vista that von Schmidt completed his surveying operations and we made a quick and uneventful trip to our homes in San Francisco.

NOTES ON DRY-FLY FISHING. No. 4.

By R. L. M., California.

SCENE: In the hills in California.

TIME: Present.

Dramatis personæ:

CLERK OF THE HOTEL.

ANGLER.

TOURIST.

Clerk: Here comes the angler. He can tell you all about that dry-fly stuff they were discussing last night. Angler, let me make you acquainted with Tourist. He wants you to tell him all you know about these dry-flies.

Angler: Well, I'll do my best. (To Tourist.) Are you going fishing today?

Tourist: No, my party is going up to Pine Lake, and as I have had enough riding in a machine to last me a long time, I'm taking a day off and going to loaf round the hotel—unless something better turns up.

Angler: How about coming out with me, then? We shall have the whole day and you can see just how the game is played.

Tourist: I shall be delighted to do so, and I am sure I shall know something about dry-fly fishing when the day is over.

Angler: When can you be ready to start?

Tourist: I am ready now. We have only three rods in the party, and all three are to be used up at the lake. All I need is to get a lunch put up—that won't take me long.

Angler: Well, let's pull out. We have about half an hour's walk before we get to the best part of the river, but a machine will bring us back in the afternoon.

Not fishing yourself, you will have a good chance to really find out something useful about the art. Usually, when anyone comes out with me, they insist on bringing their own rod. The result is, that after about five minutes of instruction, they want to fish themselves; as a consequence they learn very little.

Tourist: I come from Idaho. There we have very good fishing, provided you get well away from the towns.

While we were sitting around the fire last night, this dry-fly talk came up; it mystified me, for I had never heard of it before. Now, just exactly, what is dry-fly fishing?

Angler: I dare say you have noticed that the various insects, such as flies, beetles, or grasshoppers, always float on the surface of the water. Now, the imitations of these insects, known as artificial flies, are made of silk, feathers, fur and other substances. In order to catch the fish, these materials are ballasted with a hook. Now, as long as we can keep our artificial fly dry, it will float on the surface and thus be in much the same position as the natural insect.

Dry-fly fishing simply consists of keeping the fly dry, and if it gets wet, of drying it again as quickly as possible.

Tourist: It sounds simple, but how can it be done? I know that the first time I cast a new fly into the water it floats, but the second or third cast sinks the fly.

Angler: First of all, we put some oil on the fly to keep the water off it. Then, we grease the line, so that the line itself will float. And then, if the fly does get wet, which is not exactly an uncommon experience, instead of returning the fly to the water, on the next cast, we check the fly before it gets there and make a series of false casts backwards and forwards in the air. These false casts drive off any moisture that has collected on the fly and on the line; so that when we do return the fly to the water, it is practically as dry as it was at first.

Tourist: We got in yesterday and had lunch at the hotel. Afterwards, we drove down in this direction and went fishing. I noticed swarms of grasshoppers on the water. The trout were taking them, but they would not look at our flies. We even caught some 'hoppers and tried them, but it was no good; so we packed up and came back to the hotel. Why was it we couldn't catch any fish?

Angler: Well, when you tried flies, you were trying to coax the fish away from a very tempting morsel—viz, the grasshopper—with something that did not attract them at all. And when you used grasshoppers, I dare say, you noticed that your grasshoppers always sank below the surface of the water, whereas an unhooked 'hopper floated on the surface. Then again, the leaders you were using may have been too heavy or thick. These trout are very wise. They are fished for continuously all through the season; it is only natural to suppose that

they learn a little by bitter experience. If you could have kept your 'hoppers on top of the water and made them float with the stream in a natural manner you would, in all probability, have gotten some fish.

Tourist: We are getting near where we were yesterday. I recognize that grove of pine trees, but I don't see as many grasshoppers in the air as I did yesterday.

Angler: It is a little early yet. In an hour's time you will see just as many flying as you did yesterday.

Well, here we are at the river.

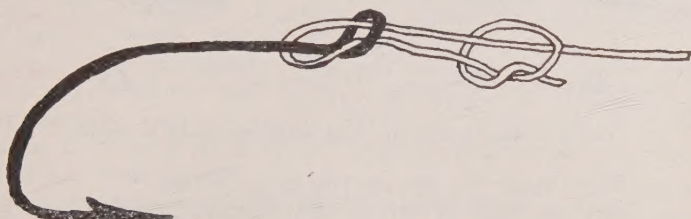


FIG. 29. Proper knot for tying large fly hook to leader.

There surely aren't many 'hoppers floating down yet. But we needn't worry, there will be hundreds later on. In the meantime, I will put my rod together and get ready for the fray.

Tourist: I notice that you have put your reel on with the handle pointing to the left. Are you left handed?

Angler: No, but I hold the rod with my right hand and wind up the line with the left. It is awkward at first, but one soon gets used to it, and I need not point out the advantage of being able to wind up the line without having to change the rod to the left hand, as you will see so many people doing.

Tourist: How long is that leader? Isn't it rather too light to handle a good sized fish?

Angler: The leader is 9 feet long. Although it only has a breaking strain of $2\frac{1}{2}$ pounds, it is quite strong enough for the average big fish



FIG. 30. The "turtle" knot, one often used.

hereabouts. I do not expect to get anything much over 5 pounds. Of course, if one got hold of a really big fish, such as 10 or 11 pounds, one would have to be extra careful, but with ordinary luck and management, it is not impossible to land a large trout on a leader such as this.

Let us sit down here and watch up and down stream for the first sign of a feeding fish.

Tourist: Why not begin fishing now?

Angler: Until you see the fish feeding on top, it is not much good trying to get them with a fly. But in a very short time you will see grasshoppers floating down stream and the fish will begin to feed.



FIG. 31. Jam knots for tying small fly hooks to leader.

Tourist: What kind of a fly are you going to use?

Angler: This one here. I call it "the floating grasshopper fly," and although it does not look very much like a real 'hopper when it is floating on the surface, it has a strong resemblance to a grasshopper in a similar position.

Tourist: How do you tie the fly on to the leader?

Angler: There are several knots that can be used. This first knot is the best for larger flies (fig. 29); then, there is this one (fig. 30) known as the "turle" knot, and finally the two jam knots (figs. 31 and 32). These last two are used for small flies.

Now, I will make a cast on that shallow water; you will notice how the fly floats and you must admit that it does look like a grasshopper.

Tourist: Yes, the resemblance is very strong. I see your line is floating as well.

Angler: If you remember, after I had put my rod together and threaded the line through the guides, I pulled off about 40 feet and rubbed the line down with this little pad which is anointed with deer

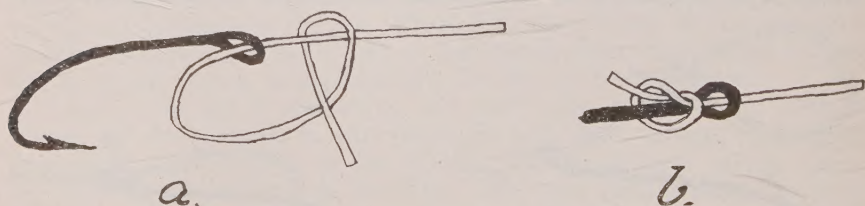


FIG. 32. A simple jam knot suitable for fastening a small fly hook to leader.

fat. That is what makes the line float, and if the line did not float it would be much more difficult to either keep the fly dry or to sail the fly accurately down over a feeding fish. Now, I will drown the fly. It is quite wet now, but just watch while I dry it. I make the forward cast—but well up in the air—and before the fly has time to fall on the water I make the back stroke again. I do this several times. Finally, I cast the fly—you see it is dry now—and it floats. Watch it.

Tourist: That looks easy enough!

Angler: Would you care to try? But before you do, just watch me again and note that I allow the line to become fairly well extended both in front and behind before I make the next stroke. Then, too, I must caution you to make your strokes with deliberation and only to use the wrist and forearm when casting. Now try.

Tourist: Well, what happened then? What made the line strike the water?

Angler: You made your forward stroke too long. In other words, you should have checked the rod before it had gone very far beyond the vertical. Shorten the line a bit and try again.

Tourist: That is better. I seem to be getting on to it now. What was that splash over there, just below that willow?

Angler: That was a fish. We will let him have a few more real 'hoppers before we try him with an imitation one. Until the fish are feeding steadily, they are rather particular as to what they take, but as soon as they have taken a few 'hoppers without any accidents they are willing to look at a fly.

Tourist: Did you see that? He took another.

Angler: Let's crawl up and get a little closer to him—never cast an inch further than you have to. Now we are in position. Watch closely and see just where he takes down the 'hoppers. There, he got that one all right! Now, run your eye up along the surface for two or three feet and locate the spot where the fly should fall so that it will float over the spot where the fish took that last 'hopper. Well, that place up stream is where our fly must fall so that it will come down over Mr. Fish in a natural manner.

Tourist: There, he has taken another!

Angler: Well, here goes. We'll try for him. I make a preliminary cast in the air just above the surface to see if my line is long enough or otherwise. Not quite enough, so I will pull off a little more; that is about right. Now watch the fly. It is getting close. Yes! He has it!

Tourist: That is a good fish. See him jump?

Angler: Will you land the fish when I bring it in? Put the net well down into the water, and with one motion lift the net and scoop out the fish.

Tourist: All right, give me the net.

Angler: All ready? Here comes the fish.

Tourist: Say, that fish must weigh two pounds. Why don't you bring it in?

Angler: Never try to land a fish until it is all in, because if you do, in its struggles, it is very liable to catch the leader on the net and then it will break loose.

Tourist: How can you tell when the fish is played out?

Angler: Whenever you see a fish turn on its side, it is a sign that the fight is over. See that! He showed his side then. He is almost finished. Here he comes. Take your time and don't get excited. Well done! You've got it all right.

Tourist: Why do you knock the fish on the head?

Angler: To kill it. It not only puts an end to the fish's sufferings, but the fish will keep better.

Tourist: How much does it weigh?

Angler: One and a half pounds.

Tourist: Is that all? I should have thought it was fully two pounds.

Angler: You will notice now, there are many more 'hoppers on the water, and look, you can see fish feeding on them all up and down the river. See, there is a fish I want you to catch.

Tourist: Now, tell me just what to do. Where shall I drop the fly?

Angler: The current is a little stronger here, so you had better drop the fly about three feet above the fish. To be exact, just in line with that little willow shoot. But, before you make your cast just cast well off to one side, where there will be no danger of frightening the fish, so as to see how the line is for length.

Tourist: The fly has sunk. Why was that?

Angler: I expect you aimed at a spot on the surface, whereas, you should have tried to cast your fly in the air so as to strike a spot about a foot above the surface. Then, the fly would have fallen on the water gently.

Tourist: Will you dry the fly?

Angler: All right, but watch me closely. I throw the fly straight out in front, then back and keep it moving quickly. Now it is dry. Try again.

Tourist: That is in the right spot. Here it comes over the fish; no good.

Angler: You made a mistake then. When your fly has passed over a feeding fish without any notice being taken of it, let the fly float well down below the fish before you lift the line off the water.

Tourist: Shall I try again?

Angler: No, I guess that fish is scared. We will move on and try for that fish that has just made such a splash behind that weed. But don't try from above; get below the fish and cast up stream.

Tourist: How is this? I think I can reach him from here.

Angler: Take your time; wait till the fish has taken another 'hopper; then you can locate him exactly.

Tourist: There, he got that one, so here goes the fly.

Angler: Ah, that ought to get him. He's got it! But what did you do?

Tourist: The leader broke and the fly is gone.

Angler: I expect you struck too hard. Well, let us move down a bit while I tie on another fly.

When you strike a fish do not strike as though you wanted to throw the fish out; just make a slight upward motion with the rod and as soon as you feel any resistance check the motion; then, keep a tight line on the fish, but do not try to see how much strain the tackle will stand; just keep an even strain on the fish and keep the fish moving.

Striking is really the most difficult thing to become proficient in. If we were using ordinary gut, which is two or three times stronger than what we are using, it would be much easier to successfully hook a fish; but the stouter gut would be much more visible to the fish and in all probability we should not have many opportunities to strike at a rising fish.

Another thing to remember is this, big trout should not be struck as quickly as you would strike smaller fish. The movements of the larger fish are, to a certain extent, deliberate. As a rule, there are no very near neighbors who might snatch the tempting morsel away.

Whereas, a small fish has generally numerous relatives close by, all of whom are on the lookout for anything that looks good.

Now come carefully round this piece of brush and get down and crawl up towards the bank.

Tourist: Well, look at that fish, you can see the spots on him. Try and catch him.

Angler: Wait a minute; let's watch him feed; maybe we can learn something useful by watching him. If you notice, there is a patch of weed that comes almost to the surface. This restricts the stream and makes a little stretch of sharp current close under the bank. The fish keeps his position just at the lower end of this sharper stream and faces up stream watching for 'hoppers. Here comes a 'hopper. See the fish move a little to one side. Then see, just at the right moment he'll come to the surface and take it down.

Tourist: That certainly is a fine fish; look at him! Say, try and catch him.

Angler: All right, here goes. Well, did you see that? There was a real grasshopper a little nearer the fish than my fly was and he took that and never even noticed the fly.

Well, I'll try again when there are no real 'hoppers in sight to distract his attention.

Now is the time: watch the fly.

Tourist: Good, he's taken it.

Angler: Keep down; don't show yourself to the fish till you have to. You go down to that point of gravel and I'll bring the fish in. But don't stand up till you have the fish in the net.

Tourist: He is trying to get into those weeds.

Angler: Yes, he knows that once there, he has a good chance of getting off.

He's beginning to get tired now, but as this is a good sized fish I shall not bring him in until he is quite worn out.

See that? He turned on his side; but it's not quite time yet, he has straightened up again. However, it won't be long now. There, put the net down low in the water and I will bring the fish in.

Tourist: Say, that's some fish! See what he weighs.

Angler: Three and a quarter pounds, and only $18\frac{1}{4}$ inches long.

Now, I want you to catch something. Before we begin fishing again, I'll break the fly off and tie it on again.

Tourist: Why do you do that?

Angler: Because the gut has necessarily become weakened at the knot. Also you see how slimy and wet the fly is. It does not look as though it would ever be dry again. I'll just slam the fly onto the water and jerk it through a few times; that will wash the slime off. Next I'll press the fly between this little pad. It is almost dry now, but to complete the drying process, while we're walking down to the next feeding fish I'll make some false casts in the air. I am going to cast the fly on that shallow water. What did I tell you? It's absolutely 'bone dry' again.

Tourist: What is that little pad made of?

Angler: It is a piece of *amadou*, which is a fungus with the properties of absorbing moisture very rapidly.

Tourist: Something like blotting paper?

Angler: Yes, only with greater powers of absorption than any blotting paper that was ever made.

Now then, here is a fish you must get. There is just enough stream to ruffle the surface a bit, but it is a steady stream so that you can cast a straight line and not have any reason to expect a drag.

Tourist: What is a 'drag'?

Angler: A 'drag' is that which results from the line moving faster or slower than the fly. If a line is cast in such a way as to make the fly draw or pull against the current and thus leave a wake behind it, the fly is said to 'drag.' I dare say, you have observed that real flies and other insects hardly ever do this. A wary trout might just be on the point of taking a fly, but if the fly suddenly began to move across the surface leaving a track behind it, the suspicions of the fish would be aroused and in all probability he would have none of your fly. However, this fish is easy of access and there is not much danger of drag. Make your fly fall on the water about two feet above the spot where he took down the last 'hopper! Above all, when he takes the fly strike him gently, as though you loved him. Now go to it.

Tourist: That seems a good cast but the fish is taking no notice of the fly.

Angler: Wait a few moments before you cast again; if you are not in a great hurry wait until he has taken another real 'hopper.

Tourist: There, he took that one. I'll try him with the fly again.

Angler: Good cast. Keep your eye on the fly. Oh, he has it! Well done—you have hooked him.

Take your time. Don't get flurried, I will land him when you bring him in.

Tourist: He seems tired out, so make ready. Now, I'm going to pull him in toward you.

Angler: Well, well, that is certainly a nice fish—two and a quarter pounds—and the first you ever caught on a dry-fly.

Tourist: I shall have something to tell the rest of the party when I meet them tonight.

* * * * *

Angler: It is only two o'clock, and the machine won't show up for another half hour. We have caught as many fish as the law permits, not large in numbers, but a full ten pounds; so while we are waiting for the machine I will give you a few more pointers.

As I have explained, the grasshopper fly, which we were using, floats on its side very much as the real insect does.

Water bred flies, on which trout feed, float on the surface with their wings up in the air. I will now put on an olive dun; we need not expect any fish to look at it, because they are far too much taken up with the grasshoppers at present.

Now, will you go up stream about forty feet and kneel down and watch the water closely?

Tourist: How will this do?

Angler: That is just about right. Now watch the surface; I will drop the fly about three feet from the bank. When you see the fly on the water tell me if you notice anything at all about it.

Tourist: Why, the fly is floating with its wings up in the air just like the real thing. How did you do that?

Angler: Now watch me make a cast. Instead of making the backward and forward strokes in a vertical plane, that is, the overhead cast which we used with the grasshopper fly, I make the strokes in a horizontal plane, which throws the line out sideways, and the fly curves around and for a moment the line, leader and fly are motionless over the water; then they fall gently, and the fly falling by its own weight naturally assumes an upright position and floats with its wings 'cocked up.'

Tourist: Why won't the overhead cast do that as well as the horizontal cast?

Angler: Because, no matter how carefully we cast, there is always the chance that the line will still have some slight momentum left in it from the cast; this motion, no matter how slight, may be enough to topple the fly over on its side. On the other hand, the horizontal cast throws the line out over the water, the line becomes extended and for a fraction of a moment all movement ceases, then gravity begins to act and the fly falls very lightly on the surface, as you have seen. Now come and try to do as I did.

Tourist: Let me see you do it again. All right, now let me have a try.

Angler: Try and see how close you can make your fly come to that little bit of rush that shows above the surface. You overshot the mark that time; the fly curled round too far.

Tourist: What made it do that?

Angler: You put just a trifle too much force into the cast. Try again.

Tourist: It was way this side of it. I guess I didn't cast quite hard enough that time. Ah! That is better. You try again.

Angler: This cast is much harder to do accurately than the overhead cast, but when you once learn it well, it is astonishing how simple it becomes.

Tourist: Why, the fly fell within three inches of the rush; I wish I could do that.

Angler: You will soon pick up the knack with practice, but watch this cast. This is the back-handed cast. It is the same as the horizontal cast only is made on the left hand side. The stroke somewhat resembles a back-handed stroke at lawn tennis, hence its name. It looks difficult, but comes just as easy as the other with practice.

Tourist: Well, here comes the machine, and I must thank you for a most enjoyable and instructive day.

Angler: I am glad you got some benefit from my teachings, and I hope you will become a highly proficient dry-fly man in the years to come.

Tourist: It certainly is a great sport. It has added to the charm of fly-fishing in a way that I thought hardly possible. I should like you to meet the rest of my party.

Angler: I will come over to the hotel after supper, about eight o'clock, but you had better take these fish, as there is just a chance that your crowd have not caught anything up at Pine Lake; even if they have, stream fish are always better eating than lake fish.

Tourist: Thanks very much. I have been hungry for trout for some time. Well, so-long till this evening.

CALIFORNIA FISH AND GAME

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All material for publication should be sent to H. C. Bryant, Museum of Vertebrate Zoology, Berkeley, Cal.

JULY 26, 1920.

"The man who illegally takes game or fish decreases food resources and defrauds his country."

A NEW EXECUTIVE OFFICER

Since our last publication Mr. Charles A. Vogelsang has succeeded Mr. Carl Westerfeld as Executive Officer of the Commission. This change is not regrettable in and of itself, for Mr. Vogelsang has had years of previous experience in the office he now holds, and has always enjoyed a deserved popularity for ability and zeal in the performance of his duties. No better appointment could have been made.

The only regret arises from the fact that Mr. Westerfeld's conduct left the Commission no alternative course except declaring his position vacant. A majority of the Board had long been convinced that a continuance of Mr. Westerfeld's services was not desirable. He became dissatisfied with his salary and devoted time due to the State to the maintenance and upbuilding of a private law practice and used the Commission's rooms and stenographer's services to that end. His lack of interest was soon reflected in the laxity of his subordinates; in view of which the majority of the Board came to feel that a change in the office of Executive Secretary was absolutely essential.

He was so advised and was accorded two months time in which to arrange for his retirement. At the end of that period, instead of resigning, he preferred public charges against Commissioners Newbert and Connell, the burden of which was that they were criminally responsible for the mishandling of State moneys. It was not, of course, charged that they had embezzled or misappropriated any of these moneys; that would have been too preposterous. The charge was that they did not remit to the State Treasury, month by month, all moneys arising from the sale of licenses, as the law requires.

The answer of the Commissioners was prompt and complete—that they had deposited these various license funds when, and as they actually became State funds—that cannery licenses, kelp and fisheries tonnage taxes, sold directly by the Commission, were remitted upon

receipt; but that hunting and angling licenses, retailed for the greater convenience of sportsmen through a large number of so-called "Resale Agents," were only to be considered as State funds after final settlements with such agents, as they were entitled to refunds for all licenses returned unsold, and their commissions could only be computed upon their actual sales. In this interpretation of the law and of their duties, the Commissioners were wholly justified and fully exonerated by an opinion of the Attorney General of the State delivered in response to the Governor's request for a construction of the law.

Manifestly, but one course was open to the Board after such a baseless attack by a subordinate, and Mr. Westerfeld was ousted from office.

F. M. NEWBERT.
M. J. CONNELL.

OPTIMISM VERSUS PESSIMISM.

We all admire the optimist, the man who believes that all is going well in spite of adverse conditions, but sometimes an "all's well with the world" attitude develops apathy and a disregard of the need of readjustment or reform. There are many sportsmen who, in spite of circumstantial evidence, glibly point out that game conditions are of the very best, that game is continually on the increase, and that there is no need for worry as to the future. Too much of this sort of optimism prevents an awakened public sentiment which would be favorable to an improvement of conditions.

Although pessimism may sometimes mean a reduction of income from the sale of hunter's and angler's licenses, yet pessimism in regard to future game conditions often stirs the public to action. Certainly a study of the game situation in our state would convince anyone that action rather than apathy is the present day need, in so far as fish and game conservation is concerned. We are inclined to believe that there is greater danger toward fish and game in the optimistic point of view than in the pessimistic point of view.

THE VALIDITY OF THE MIGRATORY BIRD TREATY SUSTAINED.

On April nineteenth of this year the United States Supreme Court sustained the validity of the Migratory Bird Treaty, a treaty which was made between the United States and Great Britain for the protection of migratory birds in the United States and Canada. It also declared the Migratory Bird Treaty Act

constitutional which was approved July 3, 1918, to carry out the provisions of the treaty. Those who have appreciated the need for this law rejoice that it has finally been declared constitutional.

As early as 1904 Hon. George Shiras 3d introduced a bill which was defeated. But on March 4, 1912, the Weeks-McLean bill was brought before Congress through the efforts of the Interstate Sportsmen's Protective Association. This association necessarily took an important part in the fight.

The Weeks-McLean bill provided that the United States Department of Agriculture should have the right to make regulations for the taking of migratory birds of all kinds. The principal attack made on this new bill was by some of the Middle Western States, Illinois being one of the most prominent. The argument made against the bill, by Illinois and other states affected, was that it practically eliminated the sport of duck hunting except for those living on the big rivers and lakes, unless there was a great sufficiency of water during the fall season, an entirely uncertain factor. The Weeks-McLean bill was attacked in the Federal Courts and was held to be unconstitutional by several of the judges in the United States District Courts, with the result that the government having been appealed to, from the adverse decision in Arkansas, the case eventually reached the Supreme Court. While the act was under discussion the treaty was made between the United States and Great Britain for the protection of migratory birds in the United States and Canada. This treaty was enacted by Congress and after the law went into effect the federal government dismissed the appeal in the Supreme Court, as the old act was supplanted by the new one.

Before further discussing the Migratory Bird Treaty, a brief summary of the provisions of the treaty is inserted as follows:

(1) The close season on all migratory birds in both countries is between March 10 and September 1.

(2) No open season can exceed three and a half months.

(3) The season is closed the year round on all migratory insectivorous birds.

(4) It is unlawful to sell wild ducks and other water-fowl in the markets in either country.

(5) It is unlawful to rob the nests of the ducks, etc., in Canada.

Returning to the Migratory Bird Treaty Act and the final settlement in the Supreme Court; on July 2, 1919, application was made before Judge Arba S. Van Valkenburgh of the United States District Court, at Kansas City, Missouri, for a restraining order to prohibit United States game wardens from enforcing the Migratory Bird Treaty Act in that state. Judge Van Valkenburgh refused. Acting under the authorization of a joint resolution adopted by both branches of the legislature, Attorney General McAllister brought this case of the *State of Missouri*, Appellant, vs. *Ray P. Holland*, United States game warden before the Supreme Court (No. 609, October Term, 1919). It was on this case that the Supreme Court, sustaining the decision of the lower tribunal, handed down the concluding sentiment which determined the constitutionality of the Migratory Bird Treaty Act. McAllister, leading the fight against the act, maintained that it trod on the rights of the state. The opinion of the court as delivered by Justice Holmes reads as follows:

"The state, as we have intimated, founds its claim of exclusive authority upon an assertion of title to migratory birds, an assertion that is embodied in statute. No doubt it is true that as between a state and its inhabitants the state may regulate the killing and sale of such birds, but it does not follow that its authority is exclusive of paramount powers. To put the claim of the state upon title is to lean upon a slender reed. Wild birds are not in the possession of anyone; and possession is the beginning of ownership. The whole foundation of the state's rights is the presence within their jurisdiction of birds that yesterday had not arrived, tomorrow may be in another state and in a week a thousand miles away. If we are to be accurate we cannot put the case of the state upon higher ground than that the treaty deals with creatures that for the moment are within the state borders, that it must be carried out by officers of the United States within the same territory, and that but for the treaty the state would be free to regulate this subject itself."

In further answer to Attorney General McAllister's stand, and concluding the

delivered opinion of the court, Justice Holmes said:

"The treaty in question does not contravene any prohibitory words to be found in the constitution. The only question is whether it is forbidden by some invisible radiation from the general terms of the Tenth Amendment.

Here national interest of very nearly the first magnitude is involved. It can be protected only by national action in concert with that of another power. The subject matter is only transitorily within the state and has no permanent habitat therein. But for the treaty or the statute, the reason might be no birds for any power to deal with. We see nothing in the constitution that compels the government to sit by while a food supply is cut off and the protectors of our forests and our crops are destroyed. It is not sufficient to rely upon the states. The reliance is vain, and were it otherwise, the question is whether the United States is forbidden to act. We are of the opinion that the treaty and statute must be upheld."

The decree was affirmed, Associate Justices Van Devanter and Pitney dissenting.

SURVEY OF THE FUR-BEARING MAMMALS OF CALIFORNIA.

Many readers of CALIFORNIA FISH AND GAME who do more or less trapping each year will be directly interested in the announcement that on December 1, 1919, the Museum of Vertebrate Zoology of the University of California began an investigation of the fur-bearing mammals of the state. The purpose of the investigation thus undertaken is to secure reliable information as fully as feasible concerning the food, breeding habits and all other points worth knowing in the natural history of our fur-bearers. It is believed that this information is especially desirable at this time so as to determine the economic status of the various species, this being in many cases in doubt to ascertain the annual catch which may be safely taken without endangering the present breeding stock, and further to furnish an adequate basis for sound constructive legislation that will protect and develop the fur resources of our state. The income to the trappers of California from this source now amounts to nearly \$400,000 annually.

All wild mammals of California whose pelts are commonly sold for fur are to be considered as fur-bearing mammals in this investigation.

Arrangements have been fully made, and the work is already well under way. Mr. Joseph Dixon, Economic Mammalogist of the above named institution, has spent a large part of the past trapping season visiting the trappers of the state and in securing first hand information relative to fur-bearing mammals. Diagrams to scale, measurements and photographs of breeding dens, notes on life history, together with photographs of the living animals in the wild have already been secured of several of our most important fur-bearers.

Blank records have been sent to the most progressive trappers of the state and these men have responded heartily. Many of them have examined the stomach contents of all the animals that they have trapped, so that we now have, in addition to field notes and collections gathered during the past eleven years by the Museum of Vertebrate Zoology, as a foundation to go on, over 350 definite records, from these reports of food found in the stomachs of practically all the common fur-bearers in this state. The trappers have also sent in all available records of females that they have trapped which have contained embryos (unborn young). This affords an accurate index to the time and rate of breeding of these animals and has a direct value in determining the date when the trapping season should close in order to "protect the crop" for the succeeding trapping season.

An important feature of recent field work has been the taking of paraffin casts of tracks made by live wild animals under natural conditions in the field. Such a cast faithfully reproduces every dimension and contour of the original track and thus affords an excellent idea of one sort of "sign" which may be looked for by trappers.

It is expected that at least three years' work will be required before the results of the investigation will be ready for publication. It is planned that this shall be in book form. Arrangements have been made to have this volume illustrated with color plates by America's foremost animal artists. Chapters in the book will be devoted to decrease of fur-bearing mammals, causes and control of this decrease, the fur trapper in California, methods of trapping and curing furs,

legislation relative to fur-bearing mammals, agricultural and game interests versus fur interests, and federal and state forest reserves as permanent producers of fur-bearing mammals.

A general account of each species is being planned for, under which will appear topics such as common and scientific names, marks for field identification, description of pelage, moult, coloration, pads, claws, measurements, weights, skulls, teeth, variation, general distribution, type locality and specimens examined. Other topics, such as mannerisms, gait, posture of body, instances of behavior, timidity, voice, tracks and other sign, sanitation, breeding dens, breeding seasons and habits, number of young in litter, time of birth, precocity of young, paternal care, enemies, nature of food (exact data), feeding and forage habits, relative abundance, estimates of population, changes within history, relation to agriculture, grazing and forestry, and economic status, will be treated in detail.

Suggestions, information and observations of special interest will be welcomed from the readers of CALIFORNIA FISH AND GAME. In order to be of most value, the locality, date, and name of the observer must be given. Address communications to

Museum of Vertebrate Zoology,
University of California,
Berkeley, California.

ADEQUATE GAME PROTECTION.

What will make for better game protective measures throughout the United States is a question which concerns all of the people of the United States who are interested in the conservation of wild life. The *Pine Cone*, the official bulletin of the New Mexico Game Protective Association, in the issue of March, 1920, states that either the inadequate, conventional methods of game protection, in vogue in practically every state in the Union, must go, or the game must go. This is rather too radical a statement, but it is generally conceded that there is a vast need for improvement in the individual state game protective departments of the United States. There are three fundamental precepts which are applicable to the state game departments in general, and which,

if striven for, and earnestly adhered to, would assuredly do much to not only solve the problem of more adequate wild life conservation in each state, but would perfect the appended system to the national department on conservation. They are as follows:

First—The slogan in every state should be, "Conservation through education."

Second—Plenary powers should be granted the commissions or departments concerned with game regulation and wild life resources, not with the idea of giving more power, but of avoiding the necessary delay entailed by state legislation. This point is aptly exemplified by again quoting from the *Pine Cone*: The state department of health is a commission to which the state legislature has delegated extensive authority in regulating public health—such as making rules for the sanitary handling of milk, closing public meetings in time of epidemic, etc. Suppose during the influenza epidemic, we had had to wait for a meeting of the legislature before closing public meetings. Yet that is no more illogical than waiting for a legislative enactment to close the season on a species immediately threatened with extermination." And

Third—Departmental duties and discretionary powers should be conscientiously executed. Particularly with regard to—

- (1) The granting of permits.
- (2) The practice of quantitative distribution of licenses.
- (3) The setting aside of game sanctuaries proportionate to the requirements of the state.

In California it is worthy of note and emphasis that 3,107,520 acres—27 game refuges by legislative enactment, 3 game preserves by the Fish and Game Commission, 5 bird reservations, and the national park areas by the federal government—have been set aside where no hunting is allowed, and where game is allowed to breed unmolested. This is, as has been stated before, roughly speaking, about 3 per cent of the total area of the state.

It is by constructive methods, therefore, that the goal of adequate wild life conservation will be reached.

A NATIONAL COMMISSION ON THE CONSERVATION OF WILD LIFE.

In the *Review* of April 17, 1920, there is an editorial suggesting the value of a national commission on the conservation of wild life. The *Review* makes the following statements:

"Good legislation in some narrow corner of the field results, now and then; but permanent advances along the entire line is impossible, so long as the matter is handled in a piecemeal way."

It is very true that greater cooperation in the work of conservation is needed, particularly in the consideration of effective methods of dealing with the problem of migratory species. The starting point for this work is conservation by education in the different states, and from this will develop united public sentiment and greater national benefits.

The United States Bureau of Biological Survey under the United States Department of Agriculture may be considered as the present national organization for the conservation of wild life. It is the beginning of what must necessarily be an actively growing institution. However, notwithstanding the unquestionable value of the United States Biological Survey, a commission would doubtless have much more freedom than the present United States Bureau has, and with a competent, fit body of men, might be able to accomplish more.

The vital point which still remains is that any central commission or national body, no matter how efficient in itself, would be more or less ineffectual unless it has the support of the individual states. Therefore, the effort of each state should be toward education which would lead directly to a cooperative spirit and the unification of endeavor. Without educational methods there will be more chance for misguided legislation, lobbying, aggressive criticism and the accompanying lack of coordinated national strength.

The conclusion is that the idea of a national commission is of paramount interest, but any national organization will be greatly hampered until it has creditable state support.

GUNS USED BY DUCK PIRATES.

Although few of the big guns used by the duck pirates, or night gunners, on

Chesapeake Bay and the rivers of Maryland, are in use at the present time, yet occasionally a new capture is made. The collection photographed is a collection



FIG. 33. Large bore guns used by duck pirates on Chesapeake Bay, Maryland. These are similar to those used by duck pirates in California previous to protective laws which put them out of business.

which has been assembled from time to time by the game wardens of Maryland. The guns measure 10 feet and weigh about 115 pounds; they are very crude affairs, some of them having been made by the "village blacksmith." Like guns were used by market hunters in California until legislation prohibited their use.

WM. H. FISHER,
Baltimore, Md.

SALMON FISHING AT MENDOTA WEIR.

Prior to the last two decades, salmon fishing in the upper waters of the San Joaquin River was confined to the use of seines and spears. Following closely

on these methods came the grabhook. This latter method could not be employed until some barrier was constructed which would interfere with the passage of the salmon toward their spawning ground. When such a barrier was devised the fish congregated in large numbers and thus became endangered by two methods of capture. Either, due to their attempts to leap the obstruction, they became a mark for the spearman, or while massed below a weir under water they became the unseen target for the unscrupulous—so-called—sportsmen, or avaricious fish vendor, neither class caring what method they employed of catching the fish so long as they got them.

In about the year 1910 or 1911, the legislature of California attempted to check the use of grabhooks, but in framing the law, the wording of the protective section has proved to be inadequate. The section which has been the source of many bitter controversies between the officers of the law and the fellow who wanted the fish reads as follows:

"Section 634. Every person who, except with spear or hook and line, said hook and line to be used in the manner commonly known as angling, takes, catches or kills any salmon * * * is guilty of a misdemeanor."

In so far as I know, we have no court interpretation on this section, so the matter is still in dispute.

Passing from the illegal methods of taking salmon resorted to by the unscrupulous fisherman, we have the spoon hook and line method practiced by the many clean true sportsmen, some of whom come from distant places in the state to take salmon. And not infrequently, the sportsman of this type is rewarded by a big fellow taking the spoon in his mouth, which results in a fight that will often last for a half an hour or an hour. Thus the angler is rewarded by a sportsmanly encounter which keeps him on keen edge until the salmon is landed.

Why salmon strike at a spoon is not really known, for they apparently take no food after entering a freshwater stream, the stomach becoming useless so that food would probably not digest even

if introduced artificially into the stomach. Then, we are prone to ask, "Why does he strike?" His known fighting qualities and unbounded determination to reach his recognized spawning bed may be an explanation for his actions. One seldom ever hears of a salmon taking a spoon until after he passes the town of Firebaugh, which leads to the inference that he apparently does not strike a spoon, after leaving the sea, until he meets with interference on his journey to his spawning bed. The town of Firebaugh is some six miles below Mendota weir, and very few salmon are taken on hook and line outside of a mile or two down the river, from the latter town. But at the weir, I have noted more than a hundred fish taken in twenty-four hours, fairly caught in the mouth with spoon hooks.

Those salmon which pass the weir travel up the river and pay little heed to lures of any kind, until they reach their final homes or spawning beds, in and near the hills. After reaching the cobble bottoms where they deposit their spawn, they again strike the spoon hook; at this time they furnish the greatest sport for the rod-casting enthusiast. Not only is the angler kept constantly on the alert, but he can find plenty of salmon pools wherein he can "let fly" one hundred and fifty feet of line and then some. The good fishing usually extends from the period prior to the time that they deposit their eggs until sometime in September; but individual salmon continue striking even on through the winter months.

Unless further protection is extended to the salmon very soon, the thrill of a salmon strike in the San Joaquin will be history. We have been very properly forced to give up the fall run of salmon to the agriculturist, and now our spring run is being depleted very rapidly. We lose vast numbers of fry in the irrigating ditches, as they travel down toward the sea. Therefore, unless we extend our best efforts to protect these fish quickly, the salmon of the upper San Joaquin River will pass into history as our elk and antelope have done.

S. L. N. ELLIS.

CHEAP SPORT FOR INFLUENTIAL VIOLATORS.

There is many a man who would gladly pay \$5 for the privilege of killing a Canada goose, provided he was sure that this was the only penalty he must pay and that he would not be prosecuted and branded as a man unwilling to play fair with his brother sportsmen. Yet there are men in this country today who are enjoying this privilege, or rather stealing it, at the low rate of \$2.50 per violation. It was only as recently as September 23, 1919, that William F. Taubel, a wealthy citizen of Riverside, New Jersey, was fined \$5 by a United States District Court in Trenton, New Jersey, for violating the Migratory Bird Treaty Act, in that he decoyed to a blind and killed two Canada geese. Since that time the same judge who imposed the fine in the Taubel case has fined other violators of the same law as low as \$2.50.

These fines contrast rather glaringly with a fine of \$1,000 imposed on October 22 of the same year, also in Trenton, New Jersey, on Emilo Trowti, an alien resident of West Amwell, New Jersey. Trowti was found guilty of violating the New Jersey game laws, and was surely deserving of his punishment, as he was caught with a bag containing forty-eight song and insectivorous birds. However, fines similar to the first ones will surely cheapen the federal law and make difficult the enforcement of the Migratory Bird Treaty Act.

It is gratifying to know that other district judges in the United States do not share the views of the one who imposed these low fines. In Wisconsin three hunters were recently fined \$100 each for attempting to kill ducks after sunset, while in Connecticut a violator was sentenced to three months in jail for a violation of the Migratory Bird Treaty Act. It is only by stringent methods that the true intent and meaning of this act can be carried out.

WATCH FOR BANDED DUCKS.

All waterfowl should be carefully examined to ascertain whether or not they are banded. The Bureau of Biological Survey, United States Department of Agriculture, Washington, D. C., and several individuals are making a practice of banding waterfowl, to ascertain their

migratory lines of flight, and it is quite necessary that full reports regarding the taking of any banded bird be made to the proper authorities.

QUAIL IMMUNE TO STRYCHNINE POISONING.

Important evidence has been secured regarding the comparative immunity of quail to strychnine poisoning. Field observations and feeding experiments conducted in California showed that one valley quail can eat grain containing enough strychnine to kill 12 ground squirrels without showing the slightest ill effect from the poison. A number of similar experiments on a mountain quail and a bobwhite gave like results. The information thus gained will tend to allay fears in certain quarters that poisoning campaigns against ground squirrels result disastrously to these valuable game birds. Investigations in Saskatchewan, Canada, have proved that grouse are equally immune to strychnine poisoning. *Ann. Rpt. U. S. Dept. Agric.*

BIOLOGICAL SURVEY TAKES OVER WORK OF AMERICAN BIRD-BANDING ASSOCIATION.

The Bureau of Biological Survey, U. S. Department of Agriculture, Washington, D. C., has taken over the work, good will, effects, and records of the American Bird Banding Association, formerly conducted from headquarters at the American Museum of Natural History in New York City. In the future, therefore, the issue of bands and information relative to the work will be from this office, to which all records of birds banded and recovered, should be sent. There will, of course, be no further dues or initiation fees.

In taking over the work of this association, the Biological Survey is particularly desirous of retaining your hearty cooperation, upon which a large part of our success will depend.

The work is to be advanced along two principal lines: first, the trapping and banding of waterfowl, especially ducks and geese on both their breeding and wintering grounds; and second, the systematic trapping of land birds as initiated by Mr. S. Prentiss Baldwin. By maintaining volunteer trapping stations at

intervals over the country, and consistently operating them throughout the year, a mass of valuable data relative to the migration routes, speed of travel, and affinity for the nest site of the previous year, as well as a quantity of life history information about the individual will be acquired.

To do this with any degree of success, the observer should be advantageously located with regard to bird habitats, as it is obvious that traps can not be regularly visited if located at any considerable distance from the operator's usual station during the day, and it is imperative that they be visited at least two or three times daily to prevent the birds captured from injuring themselves against the wires. The fascination of the work, however, will amply repay anyone for the little time and trouble, and for the expense for traps and baits.

Experiments are now under way to determine the most suitable types of traps and the best methods of trapping; and arrangements are being made for a supply of bands.

In the meantime, however, the Biological Survey desires to invite continued cooperation and will welcome any inquiries or suggestions for the advancement of the work. The Bureau particularly desires to get in touch with those advantageously located for the establishment of trapping stations.

NEW ZEALAND ENCOURAGES FISHING INDUSTRY.

Recently the Industries Committee, of the House of Representatives of New Zealand, traveled throughout the Dominion to find out how new and budding industries might be assisted and encouraged. The fishing industry amongst others was investigated and the following interesting recommendations were made:

That the best way to bring about the development of the industry is by organization for catching, distributing and, where necessary, preserving the fish. The only way to provide adequate supplies and prices within the reach of all is by trawling.

It recommended that a separate fisheries department of the government be established with a director and staff.

That the government own and operate steam trawlers, and establish fish-chilling and ice-making plants near the fishing grounds and engage generally in the business.

That the government advances be made to fishermen on the security of their boats and fishing outfit.

That the fishermen's boats be insured by the state office at a low rate.

That a systematic, scientific and practical survey of fishing grounds be undertaken without delay, and that the government purchase a properly constructed and equipped vessel for this work.

That government assistance be given to encourage the canning, curing and commercial preparation of fish food, special attention being given to the canning of crayfish.

That encouragement be given for the manufacture of fish manure and the production of fish oil (other than whale oil).

Several recommendations were made for licensing and controlling the business of whaling, among which were (1) that the whaling company should give guaranty that every portion of a whale's carcass will be used, and (2) that each company be confined to sixty miles of coast and each must take at least a certain number each year.

KARAKUL SHEEP INDUSTRY.

A few years ago considerable publicity was given the fact that some karakul sheep, noted for their fur, had been imported from Siberia. Added interest now pertains to this importation because of the fact that some of the original imported stock has been moved to California from Texas. The Kerman Karakul Sheep Company secured 200 animals from Texas in 1918, and the herd is now considerably larger. The outstanding importance of this breed lies in the splendid fur which is produced. It now appears also that this breed will do well even on scanty alkali vegetation. The karakul sheep will stand on its hind legs and browse high up, and therefore needs less territory as range. The lambs grow rapidly, sometimes attaining a weight of sixty pounds in two months. The mutton has a peculiar gamey flavor, and the large amount of fat (about

twenty pounds to each animal) is valuable. According to P. A. Ingvason, manager of the ranch at Kerman, a



FIG. 34. Karakul lamb showing fur in prime condition. The Karakul sheep industry has spread to California.

better and hardier sheep is obtained by crossing the karakul with a Mexican wool sheep.

A new fur industry is therefore being developed in California. Although the animals utilized are domesticated, yet the increase of furs of this sort should add much to reduce the toll taken of native fur-bearers, and consequently this new project should be looked upon with favor.

SUGGESTED BIRD RESERVATION ON MONO LAKE.

A colony of gulls is located on a large island in Mono Lake where it is customary for them to breed each year. Recently a desert homestead has been taken up with an entry on the lake, and a summer residence has been built there. I understand that the homesteader proposes to stock the island with goats, which may be a fad that will be short lived. However, it strikes me that some attention should be given to the preservation of this colony of gulls, which is somewhat unique on account of the fact that it is situated so far inland, and also because it adds greatly to the interest taken in the Mono Lake region. This territory is rapidly coming to the front among the tourists as a recreation ground, and I feel that all due precaution should be taken to retain the interesting features of the locality. I have had it in mind for some time to advocate the setting aside of a sufficiently large portion of this island as a bird reservation, to insure their continued residence, through the aid of due protection.

No doubt you will be interested in this case, and if you care to take it up further, I will be glad to do all in my power to assist you in the matter. It is quite evident that unrestricted goat raising on the island would have a disastrous effect on the birds.

W. W. MAULE.



FIG. 35. Black fox at Tahoe Fox Farm.

FOX FARM A SUCCESS.

The foxes at the fox farms of Lewis and Kierman, situated near Pomins, Lake Tahoe, are doing splendidly. The snow and cold, moist atmosphere at Lake Tahoe puts the fur in prime condition. The accompanying photograph is a picture of "Tahoe Queen," a black silver fox at the fox farm of Lewis and Kierman, which is valued at \$3,000. The results thus far have been so encouraging that Lewis and Kierman are contemplating enlarging their fox farm of silver black foxes. JOSEPH H. SANDERS.

DEER PROTECTION IN SISKIYOU COUNTY.

There is nothing so abhorrent to the true sportsman as the wanton slaughter of deer, and especially the ruthless killing of a doe. One morning in March, 1919, the writer came upon a spectacle of this kind which so aroused him that he is prompted to utter a protest against such butchery. He was riding on horseback through the winter range for mule deer in Siskiyou County, which extends from the Weed Big Springs road as far north as the foot of Goose Nest Mountain and as far east as Morrison Station on the Klamath Falls line. In this section there are several hundred deer that come from the higher mountains and even from the lava beds to winter. There was about one inch of snow on the ground. Suddenly there appeared in the snow a blood trail with a man's track following. The writer determined to investigate. He did not have far to go when he came upon a sight that made his blood boil. There under a little bunch of pines he found the head of a mule doe and nearby two unborn fawns that the violator had taken from her. It was late in the evening and the writer had no kodak. When he returned next morning to get a picture he found that the coyotes had been there in the night and nothing remained.

This, however, was not the first slaughtered doe that the writer has found. The previous year on this same range he had come upon a mother and two yearling fawns, both does, wantonly killed and left for the coyotes. Furthermore, almost every day of the week shots may be heard in this section and evidence found of deer killed out of season. Game hogs have

even gone so far as to build roosts in the trees, that they may have a better vantage point to watch the runaways.

In view of the conditions existing on this range it would almost seem advisable that a special patrol be established here from the first of December until the first of May, by which time the deer will have gone back to their summer ranges and can protect themselves.—EDWIN H. BUS-COMB, Edgewood, California.

BIRD CENSUSES.

In order to better regulate national affairs it is necessary to know the population from year to year so that fluctuations may be noted. Hence the ten year census. Likewise if we would control bird and animal life to better meet our needs it is necessary to obtain figures as to the wild life population. A number of states have recently inaugurated game censuses and the United States Biological Survey is advocating bird counts to gain knowledge of the total bird population and its fluctuations from year to year. Reliable observers the country over are being sought to undertake bird counts during the nesting season and to forward reports. In the hope that some of our readers may be interested in the work, and to show the thorough manner in which the work is undertaken, we are adding the following directions issued in Washington:

The height of the breeding season should be chosen for this work. In the latitude of Washington, D. C. (latitude 39 degrees), May 30 is about the right date for the first count; in the latitude of Boston the work should not begin until a week later, while south of Washington an earlier date should be selected. In any locality the count should be made soon after the end of the migration and during the early part of the nesting season.

What is wanted is a count of the pairs of birds actually nesting within the selected area. Birds that visit the area for feeding purposes only must not be counted, no matter how close their nests may be to the boundary lines.

In making this count, it is a good plan to begin at daylight some morning at the height of the nesting season and zigzag back and forth across the area, counting the male birds. Early in the morning every male bird is usually in full song, and at that season may safely be considered to represent a breeding pair. The results of one day's count should be checked and revised by several days of further work to make sure that every bird

counted is actually nesting within the area and that no species has been overlooked.

The tract selected should represent the average farm conditions, and should not have an undue amount of woodland. It should contain not less than 40 acres—a quarter of a mile square—nor more than 80 acres, and should include the farm buildings, with the usual shade trees, orchards, etc., as well as fields of plowed land and of pasture or meadow.

The final results of the count should be sent to this Bureau as soon afterward as convenient, and should be accompanied by a statement of the exact boundaries of the selected area, so explicitly defined that it will be possible 25 years hence to have the count repeated. The name of the present owner should be given, together with a careful description of the character of the land, including a statement of whether it is dry upland or moist bottom land; the number of acres in each of the principal crops, or in permanent meadow, pasture, orchard, swamps, roads, etc.; the kinds of fencing used; and the amount of brush along fences, streams, roads, or in permanent pasture.

If there is an isolated piece of woodland comprising 10 to 20 acres conveniently near, a separate count of the birds nesting therein also will be useful. In this case the report, in addition to specifying the size and exact boundaries of the area, should state the principal kinds of trees and whether there is much or little underbrush.

A third count desired is of some definite timbered area—40 acres, for instance—which is part of a much larger tract of timber, either deciduous or evergreen.

Still a fourth count, supplementary to these, is needed. The average farm in the Northeastern States contains about 100 acres, and the average count hitherto has been of the birds nesting on the 50 acres of the farm nearest to and includ-

ing the farm buildings. It is now necessary to obtain counts of the remainder of the farm, the wilder part containing no buildings, especially on the same farms where counts about the buildings have already been made.

Furthermore, counts on any other kinds of land are much desired for comparison.

Persons who have made counts in previous years are requested to repeat the work on the same areas. New areas selected should be such as are not likely to have their physical conditions much changed for a number of years. If succeeding annual counts show changes in bird population, it will thus be known that they are not due to changed environment.

The several kinds of counts are needed for a study of the relative abundance of birds under changing or stationary conditions. It is hoped that many persons interested in bird life will make one or more counts this season. As the department has no funds to pay for this work, it must depend wholly on voluntary observers. A supply of report blanks will be furnished on request. Requests for these should be addressed to Chief, Bureau of Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BEAR PROTECTION FAVORED.

It is reported that interest in black bear protection is always increased at the time of a blackleg epidemic in that the bears can be depended upon to eat up cattle which have died from blackleg, thus helping to prevent the spread of disease. Residents of Tuolumne County in past years have been wide awake to this benefit conferred by the black bear.

FACTS OF CURRENT INTEREST.

Work on the new \$30,000 Tahoe Hatchery was resumed May 1 and it will be ready for occupancy August 15.



Ray Morris of Taft, California, was tried on March 10, 1920, on the charge of having deer in his possession during the closed season. He was sentenced to thirty days in jail and fined \$250.



Floyd E. Baker of Los Angeles was caught by Deputy Ober in Nine Mile Canyon, Inyo County, while attempting to leave the mountains with twenty-four deer hides and nine sets of antlers which he had secured in Tulare County. He was tried April 27, and sentenced to 150 days in jail and a fine of \$350.



Low water conditions have precluded a large take of rainbow trout eggs this season. At some of the best egg collecting stations but small takes of eggs have been secured.



The Fish and Game Commission has carried its educational campaign into the summer resorts of the state. In cooperation with the National Park Service, lectures and field trips are being furnished visitors to Yosemite National Park.



According to records kept by deputy game commissioners and forest employees, 1243 deer were killed in Trinity County during last year. It is estimated the total number was at least 2000, as many hunters come into the county during the hunting season and kill deer, records of which are never kept.

HATCHERY NOTES.

W. H. SHEBLEY, Editor.

On April 30, the application lists for fish for the season of 1920 were closed. Prior to this date application blanks had been forwarded to all sections of the state, in order that interested parties might have ample opportunity of filing applications for fish for the purpose of stocking all streams open to the general public for fishing purposes. The applicants were cautioned that it was very necessary to have their formal applications on file in the office of the Department of Fish Culture prior to the date of closing, in order that they might be assured of receiving a supply of trout fry this season.

Nearly five hundred applications were received, and they came from every section of the state where conditions are favorable for the planting of trout fry. The majority of the applications were received from private individuals, although there were also a considerable number received from boards of supervisors, chambers of commerce, public associations of anglers and fishing clubs.

The season just closing has been a very unfavorable one for collecting trout eggs. Every egg collecting station was in operation this season and every effort was made to obtain a larger number of trout eggs than ever before, as it was realized that the demand for fry would be greater than ever before in the history of the Commission. The completion of the hundreds of miles of new highways and the ever increasing number of anglers is in large measure responsible for the increasing demand.

The drought of the past winter and early spring made it very difficult to obtain even a fair take of eggs at some of the best stations. The streams were so low in some sections that the spawning trout could not possibly ascend the streams to the points at which the egg collecting stations are located. This condition was noticeable at the Snow Mountain Egg Collecting Station on the Eel River, where in normal seasons from four to seven million steelhead eggs are obtained. This season less than one million eggs were taken at this station.

The run of fish in Scott Creek where the Scott Creek Egg Collecting Station is located, was also far below normal and

less than half the usual number of steelhead trout eggs were obtained.

In the Bear Lake section, in San Bernardino County, where new racks, traps, holding tanks, etc., have been installed on the streams tributary to the lake, the take of rainbow trout eggs was practically a failure. Where there was every reason to expect a take of from four to six million eggs, only one and one-half million were obtained. In this section the long drought was followed in the early spring months by heavy snows and stormy weather. As the season advanced water in the lake was comparatively warm, while the streams flowing into the lake ran bank full of cold, roily water from the melting snows in the surrounding mountains. Under these conditions the spawning fish, which had gathered close to the mouths of the creeks, would not enter the streams to spawn except in limited numbers. Over retention of the eggs resulted and consequently when the fish were taken in our traps, the majority of the eggs were impossible of fertilization.

At the Klamath River stations in Siskiyou County there was a fair run of rainbow trout and a fair take of eggs was obtained.

Conditions at the Almanor Hatchery in Plumas County were unfavorable for egg collecting operations and we were unable to take any eggs at the station. A fair take, however, was obtained at Clear Creek Hatchery and the Domingo Springs Hatchery promises to turn out a million or so of rainbow trout eggs.

The water levels in Lake Tahoe were far below normal this spring, and while the season has not closed at this writing, it is extremely doubtful if more than a third of the normal take of black-spotted trout eggs will be obtained.

Our extensive system of breeding ponds at the Mount Shasta Hatchery has, however, produced a fine large take of Loch Leven and brown trout eggs and also a nice lot of eastern brook eggs. These eggs have all been hatched, and the resulting fry are thriving well and will soon be ready for distribution.

Under these conditions it will be readily seen that the number of trout fry available during this coming season

will be less than during several previous years, and consequently the allotments to the various applicants will be materially less than usual.

Two distribution cars will start out with fish about the middle of June, and applicants are urged to take every precaution to insure the safe delivery of all the fish allotted to them.

Applicants are instructed to make proper arrangements for meeting the fish cars promptly on arrival of the train as scheduled, provided with adequate transportation to handle the fish from the station to the streams to be stocked. Also that they have on hand the amount

stream and then inclining the top of the can up stream thus allowing the water to flow gently into the can, or by pouring out a portion of the water from the can and filling it with water from the stream to equalize the temperature. Fish should always be planted in shallow, running water, avoiding pools, and should be well scattered.

In the past, in many instances, considerable numbers of fish have been planted by some of the applicants at one or two points on a stream. Far better results can be obtained by distributing the fish a can at each point along a considerable distance of the stream.



FIG. 36. The old Tahoe Hatchery, which will be abandoned when the new hatchery is completed.

of ice required as per instructions mailed to them in advance of the date of shipment. The applicants are further urged to follow instructions carefully in the matter of avoiding delays in order that the work of aeration of the water may be lessened and to insure the fish arriving at the streams at the earliest possible moment and in the best condition. Attention is called to the fact that it is necessary to keep the fish protected from bright sunlight, when removing the covers of the cans for the purpose of aerating the water or inspecting the fish.

On reaching the waters to be stocked the temperature of the water should be equalized by placing a can of fish in the

In planting fish where it is necessary to carry the cans any distance from the wagon or auto truck, it is imperative that someone remain with the wagon and aerate the water in the remaining cans of fish during each planting. Also when stops are made for meals or other delays someone must be left with the fish to give the water the necessary aeration.

It is hoped that approximately 15,000,000 trout fry will be available for distribution, despite the unfavorable conditions for egg collecting operations this year, and if this number are properly planted, the streams will be provided with an adequate number of fry to insure fairly good fishing next season.

NOTES FROM THE STATE FISHERIES LABORATORY.*

WILL F. THOMPSON, Editor.

THE "DAY" AND "NIGHT" SURF-FISHES OF NORTHERN CALIFORNIA.

It is very obvious that we know comparatively little about the fishes which inhabit the surf, or come there to spawn at the proper seasons. Notes regarding them are all of some value and usually will form valuable additions to our knowledge. The following are made from specimens received from Captain Tibbetts, of Eureka, to whom we are therefore considerably indebted.

In CALIFORNIA FISH AND GAME for October, 1919 (Volume 5, No. 4), on page 203, Captain Tibbetts is quoted regarding two species of fish which are caught in the surf. One of these, known as the "night surf-fish," he believed to be the grunion, but upon our expressing some doubt regarding this, he sent us three specimens, taken a little south of Trinidad Harbor, on the ocean beach. They prove to be a species of the genus *Osmerus*, and its occurrence under the conditions noted is a fact well worthy of attention. What its habits are, and whether it spawns in the surf, is not known.

Captain Tibbetts was also kind enough to send us four specimens of the "day surf-fish." These, as we surmised in the article quoted above, belonged to the genus *Hypomesus*, which is caught in the surf along the California Coast north of Monterey.

THE GRUNION AT MONTEREY.

The spawning of the grunion is not known north of Long Beach, either to scientific men or to others. But, as Mr. Carl L. Hubbs has pointed out to us in a recent letter, the type specimen of the species was recorded as from San Francisco. Jordan and Hubbs in their review of the family *Atherinidae* state that the original specimen came from San Francisco Bay, in which they supposed the species to live. However, this is improbable, when the life history of the species and its habits of spawning

in the sand are considered. It is more likely that the fish was found in the markets, and came from some other locality on the open ocean close to San Francisco. A specimen of the grunion was found, on February 28 of this year, in the Monterey markets among fish taken locally in a seine.

In view of this proof of the presence of the species in these waters, high hopes were entertained that this remarkable species would be found spawning on the beach in northern waters, and attempts were made, in so far as circumstances permitted, to find them or their eggs.

On the night of March 6 Mr. Weymouth and Mr. Sette kept watch on the beach at Oceano, and found no sign of spawning fish, although the tide was the same approximately as that of the first run of the preceding year at Long Beach. Since the beach at Oceano is a splendid one, it was hoped that proof of their presence would be obtained there if any run occurred.

On April 6 a thorough search for eggs was made by Mr. Thompson, Mr. Sette and Miss Edwards along the beach between Del Monte and Seaside in Monterey Bay, but no signs of them were found, although if spawning had occurred to any extent during the preceding full moon tides, which were at their crest on the third of April, they would have been found. Again, on May 5, two nights after the full of the moon of May 3, Mr. Thompson and Mr. Weymouth patrolled the beach during the proper stages of the tide, but saw no signs of the fish themselves. In conjunction with the total lack of popular knowledge of a run, these attempts throw a certain amount of doubt on the occurrence of any extensive spawning run in these waters. It is of course still possible that a small run occurs somewhere near by, perhaps even on Del Monte Beach, or it may be that the specimens to be found here are simply strays. Further search will be made whenever opportunity offers.

*California State Fisheries Laboratory, Contribution No. 19.

ENEMIES OF THE GRUNION AT LONG BEACH.

The normal run of grunion occurred at Long Beach on May 4, 5 and 6, and on the fourteenth Mr. Thompson and Mr. Higgins obtained large numbers of pods of eggs for the purpose of photographing the hatching when the eggs were in the proper stage. Greatly to their surprise, every third pod at least was badly infected with maggots, presumably those of the same fly whose maggots were found the preceding year but of which the species name was not determined. Even the pods set aside as clean were subsequently found to be infected, and it proved impossible to raise the eggs to the hatching stage without great injury. Not one in twenty-five of the eggs would hatch when the proper time came, although they were for the most part alive. As the normal percentage is near 100, this was a considerable disappointment to the photographer. The failure to hatch was undoubtedly due to the maggots, in conjunction with a very extensive infection by a small nematode worm which accompanied the maggots. The sand in which the eggs were was foul and ill smelling.

miles out from San Francisco. He said that he saw two schools of fish and that those he caught weighed 18 to 20 pounds and that they had squid in their stomachs. The gonads of the fish were about one foot long and he could see developing eggs about the size of a pin head. They were caught on the eighteenth of December, 1919.

The reader who is interested might refer to a record of the taking of albacore off Northern California, on page 203 of the October number of CALIFORNIA FISH AND GAME for 1919. Such records are interesting as showing extremes of distribution.

OIL ON PISMO BEACH.

Professor Weymouth, engaged in studying Pismo clams for the Commission, reports that on the twenty-first and twenty-second of May, on the beach at Oceano and Pismo, a great many dead sea birds were observed covered with oil, and that many more still alive were lying on the beach with their feathers gummed with heavy oil. Dogs running on the beach chased and killed many of these. Ducks of various species and loons were observed among them. Professor Weymouth stated that he did not observe any clams dead from oil, probably because he was not on the beach at the right time.

The destruction caused among birds and mollusks by floating crude oil has been pointed out several times in these columns, and it is evident that the damage is still proceeding. An article by Professor Weymouth in regard to the destruction of mollusks appeared in CALIFORNIA FISH AND GAME, volume 5, No. 4, page 174.

ALBACORE OFF SAN FRANCISCO IN DECEMBER.

Mr. H. B. Nidever, assistant in the San Pedro office, furnishes the following note regarding the albacore:

F. G. Grotto, of San Pedro, who has fished for albacore here for several seasons, tells me that while he was making a trip on the "Daisy Mathiews," a lumber schooner from San Francisco to Honolulu, he caught two albacore trolling from the steamer about 280

CONSERVATION IN OTHER STATES.

NEW YORK DISPLAYS COLORED MOTION PICTURES.

Motion pictures in natural colors, showing the Adirondacks in summer and also at the height of their autumnal brilliancy, will form one of the special features of the New York Conservation Commission in carrying on its educational campaign. These natural colored motion pictures, taken during the past season, are the first of their kind ever taken in

the Adirondacks, and were produced by an entirely new process.

HEAVY PENALTIES FOR HUNTERS IN MICHIGAN.

Five hundred dollars, the maximum fine, recently was levied by a judge in Michigan against a hunter for selling 32 ducks in violation of the Migratory Bird Treaty Act. Another violator of the same law, in Connecticut, who has been

guilty of repeated offenses, was sentenced recently to three months in jail. This offender was not given the alternative of paying a fine. The Migratory Bird Treaty Act has been in force since July, 1918, and several hundred convictions have been secured. These cases are cited by the Biological Survey, United States Department of Agriculture, which administers the law, to show the increasing concern with which the courts regard violations of this important statute, designed to protect migratory birds, insectivorous birds and nongame birds.

COOPERATIVE INTEREST BETWEEN STATES.

The New York Zoological Society offered a reward of \$200 for the arrest and conviction of any one killing antelope. On December 11, 1919, the following resolution was passed:

Resolved, that the chairman be directed to notify Mr. William L. Finley, State Biologist of Oregon, that the New York Zoological Society hereby authorizes and will pay a reward of \$200 for information leading to the arrest and conviction of any one killing wild antelope in the State of Oregon, upon the condition that the Oregon Fish and Game Commission give publicity and post notices to the above effect, and the treasurer of the society is hereby authorized to pay from the funds of the society the stated reward upon satisfactory evidence of such conviction.

The payment of this reward has been authorized and a check for \$100 has been sent to Mr. George Tonkin, U. S. Game Warden, box 1531, Boise, Idaho, and a check for \$100 has also been sent to Sheriff E. E. Woodcock, Lakeview, Oregon.

The Boone and Crockett Club are about to pass a similar resolution, which will apply to future convictions only.

WATER POLLUTION IN OHIO.

For ten years the water pollution problem was ineffectually dealt with in Ohio. Between 1909-1919 the responsibility of the yearly increasing urgency for action was passed from one department to the other—Health, Fish and Game and the State Chemists. The chemists accumulated much analytical information but they seemed to have found no remedy. In 1919 Mr. A. C. Baxter, Chief of the

Ohio department, Mr. J. W. Stuber and Mr. J. T. Travers, Supervisor Stream Pollution, Ohio Department of Agriculture, took hold of the question and now, after having conducted experiments for over a year, Mr. Travers and Mr. E. J. Lewis, a water expert and chemist of Bellaire, Ohio, are ready to demonstrate the satisfactory results of their experimentation.

The process is the treatment of the pollution in vats as it leaves the factory or mine with a chemical having a lime base. This chemical precipitates or controls any organic pollution held in suspension in the vats, and also releases any poisonous gases.

The cost of the treatment is from 2 to 3 cents per thousand gallons, depending on the nature of the pollution, and the cost of installation is about \$1,000. It is claimed that the by-products will often more than pay for the cost of installation and operation. The character and amount of polluted matter which is emptied into the Ohio streams daily is as follows:

Steel Mills—Sulphuric acid, three per cent solution. Six thousand gallons per day as an average from each factory polluting streams.

Straw Board Works—Organic matter which generates poison gases that displace the oxygen in the water and causes a sickening stench. Average of 800,000 gallons every 24 hours emptied into adjacent streams at each plant.

Sugar-beet Factorics—Deadly organic matter which drives the oxygen from the water and kills every living thing in it. An average of 3,000,000 gallons every 24 hours from each sugar-beet factory in the state that uses a stream as a sewer.

Canning Factorics, Cheese Factorics and Casein Factorics—Deadly organic pollution. Two thousand gallons per day from each factory that empties pollution into a waterway or stream.

Coal Mines—Copperas water containing from 300 to 500 grains per gallon of ferrous sulphate, deadly to aquatic life of all kinds and strong enough to eat up a steel rail in ten days. From 10,000 to 50,000 gallons per day, each mine.

The problem of stream pollution to all State Fish and Game Commissions is one of vital importance because of the exterminating effect of pollution on all forms of aquatic life.

The manufacturers throughout the State of Ohio are planning to install the

system as soon as possible and the opportunity will be open to the other states of the Union to profit by this most valuable discovery.

GAME LAWS IN MASSACHUSETTS.

The game law of Massachusetts makes an open season on deer in that state from sunrise on the first Monday of December to sunset the following Saturday, the bag limit being one deer in a season, and it to be killed with a shotgun. There is no open season in Massachusetts on ruffed grouse, but quail and pheasants may be hunted legally each year from October 20 to November 20. The bag limit on quail is four in one day, or

twenty during the season, and on pheasants two in a day, or six in a season.

American Field.

GAME LAWS IN COLORADO.

In Colorado there is no open season on elk, mountain sheep, antelope or beaver, but one is permitted to kill one deer having two or more points on each horn, from October 1 to October 4, both dates inclusive. Aliens are not permitted to hunt in the state or to own or possess firearms. Shipment of game out of or into the state is permissible, providing the shipper has a transportation permit issued by the State Game Commissioner, but not otherwise.

American Field.

LIFE HISTORY NOTES.

A CALIFORNIA CONDOR SEEN NEAR HEAD OF DEER CREEK.

On May 11, 1920, while inspecting a timber sale area at the head of Deer Creek, east of Hot Springs, California, in the Sequoia National Forest, with Supervisors Cunningham and Benedict and Deputy Supervisor Derby, we noted an immense bird circling over the clump of redwoods (*Sequoia gigantea*) on Deer Creek. The bird settled in the top of one of these trees 400 to 500 yards away from us. In flight it was like a buzzard, except that it was entirely too large. It had a brownish beak, a ruff around its neck, a light brownish color on the under feathers of its wings, and it had a very large wing spread. It appeared to be an adult specimen, the white tipped wing coverts and lanceolate feathers about the neck being particularly noticeable. We judged at the time that it must be a specimen of the California condor

(*Gymnogyps californicus*), and in looking up the subject on our return to Hot Springs the description for that bird fitted very well the bird we had seen.

PAUL G. REDINGTON.

DUCKS IN THE IMPERIAL VALLEY.

During December ducks were fairly numerous in the Salton Sea at the mouth of the Alamo River, in Imperial County, but they were very difficult to approach and very few sportsmen were able to secure more than five or six birds at a time. A preponderance of shovellers was in evidence. Even with an abundance of ducks good shooting is limited in the Imperial Valley, owing to a lack of suitable shooting ponds. Apparently the best bags are obtained at certain seasons of the year when a high wind is blowing. At such times canvasbacks and "bluebills" are secured along their lines of flight.

UNITED STATES FOREST SERVICE COOPERATION.

STEELHEAD TROUT IN THE CALIFORNIA NATIONAL FOREST.

There are a number of streams in the California National Forest well stocked with fish. Those on the east side, flowing into the Sacramento River, are stocked with rainbow trout; and on the west side, the streams tributary to Eel River, with steelhead trout. A few other varieties, such as Loch Leven, eastern brook and black-spotted trout, have been introduced into the east side streams. It is commonly believed that steelhead trout, after attaining a length of 7 or 8 inches, migrate to the ocean, returning after maturity, being usually from 24 to 40 inches in length and weighing from 5 to 15 pounds. These large steelheads have been coming up the various branches of Eel River only, probably for all time; but until recently they were practically exterminated every year by Indian fishermen. There is one stream on the forest, the north fork of the Middle Fork of Eel River, which has many large, deep holes in which these fish stay all summer if unmolested, and as they readily take a hook they furnish splendid sport. Until the past few years the Indians have systematically netted and blasted these holes until they got every fish. We have been making a determined effort to stop this practice, with some results. During the past season two Indians were caught in the act of using illegal nets, one of whom plead guilty to the charge and a fine of \$100 was imposed on him.

DEER SEASON TOO EARLY ON THE EL DORADO FOREST.

The open season on deer in Fish and Game District 1-I is believed by local forest officers to be entirely too early. It had far better be reduced to one month, from September 15 to October 15, than as it is at present. August 15 to September 15 is a very hot period, and many of the deer killed, or large parts thereof, spoil and are unfit for use.

In quite a few of the streams on the north side the fish (trout being the only game species) are pretty well depleted since up to last year little or no replenishing was done. Many of the lakes never have had any in them. At the proper

time considerable cooperation can be gotten from interested parties, and the Forest Service should plan to be in position, financially, to help out.

MULE DEER ON THE LASSEN FOREST.

Big game, as it goes in California, is to be found on the Lassen in abundance. The mule deer (*Odocoileus hemionus*) is plentiful in the northeastern part and appear to be on the increase. They winter in the lava beds of Lassen and Modoc counties, and follow the snow to the higher areas in the spring. The bucks do not run with the does during the summer. Both, however, stay at comparatively low elevations until the middle of the summer when the bucks go to the high ridges. They will stay on the summer range until there is considerable snow before moving to the lower elevations. All move out together over well defined trails. The rutting season is November and December and the fawns are born in May and June. They usually are in pairs, one buck and one doe. The game refuge 1-F has been posted and we do not believe that there was any hunting within this area this season. It is well situated and should be a material factor for the increase of the species in its locality. There is considerable controversy as to whether or not the mule deer and Columbia blacktail deer cross. On certain ridges and mountains mule deer but no blacktail deer will be found, while on others blacktail only are found. However, several deer have been killed on the Lassen within the past two or three years that are apparently crosses, having the tail of the Columbia blacktail with no patch of white around the base of the tail, but having all other appearances of the mule deer. One of these is reported to have weighed one hundred and eighty pounds.

The only other species of deer known to be indigenous is the Columbia blacktail. This species is found in every part of the forest but less often in the country where the mule deer abounds. This deer winters in the foothills of the valley and moves to the higher areas as the snow goes off. During the spring and summer the bucks are to be found on the high rough ridges and the does and fawns on the

meadows and flats. Bucks are often seen at the timber line on Brokeoff Mountain and Lassen Peak at an altitude of approximately 9500 feet. At the time of the first snows both bucks and does begin to move to the foothills. Ordinarily they all follow one or two routes. One of the best known of these is down the ridge between Deer and Mill creeks, just north of game refuge 1-G. The last few days of the season dozens of hunters congregate in that area and slaughter the deer as they move out. We are not prepared to make a definite recommendation at this time but it seems that it would be advisable to extend the refuge to include this area. Another well defined deer trail is the ridge between Mill Creek and Battle Creek at Mineral. There are a number of hunters here late in the season too but apparently not enough to warrant the creation of a game refuge. The winter range is the foothills below pine timber. The summer feed is largely browse with a little grass and with acorns. Rutting season is from November 1 to December 15 and the young are born from May 1 to July 1. As a rule, the fawns are in pairs, one doe and one buck. The bucks shed their horns from February 15 to April 1. Deer were fairly plentiful last year, but apparently have decreased 5 per cent in the past twenty years. The area in game refuge 1-G is well adapted for the purpose intended but we are advised that game violations are frequent. Owing to the remoteness of the area from the center of the forest and the press of other work forest officers are unable to give the refuge the protection that it should have. If wardens could be appointed for the area much better results would be secured. During the winter, when the state game wardens are known to be in the rice fields, game trespassers are said to be numerous in the foothills. Very probably an occasional trip by the state game wardens would lessen this form of game violation 50 per cent.

The Lassen offers some of the best trout fishing in California. The rainbow are indigenous to practically all of the streams. In past years rainbow, eastern brook, Lock Leven and black-spotted fry have been planted. Of these the eastern brook and rainbow have done the best. No record has been kept of the relative

number of each species planted but it is found that in the streams planted the rainbow have done the best in the deeply shaded canyons while the eastern brook, black-spotted and Lock Leven have done better in the open stream as it flows through meadows. In Battle Creek at Mineral a catch will average 60 per cent eastern brook, 5 per cent Lock Leven, 10 per cent black-spotted and 25 per cent rainbow in the meadow and will run 90 per cent rainbow in the canyon less than a mile away. The part of the stream through the meadow has been more heavily planted than has the part of the stream in the canyon. Several of the small lakes within the forest have been planted. Steelhead were planted in Juniper and Grassy lakes in the summer of 1914. Two and three pound fish were taken from this lake in 1918 and some reported to weigh ten pounds in 1919. There has been considerable discussion as to whether these fish will spawn in the lake as it has no streams running into or from it. Some have contended that as the fish are unable to spawn in their usual habits they will die and that within a few years the lake shore will be covered with dead fish. This has not occurred as yet. The trout planted in most of the streams have remained quite small. The California Fish and Game Commission have established a hatchery and egg taking station within the forest at Domingo Springs on the Feather River and are planning another one on Warner Creek. Both of these streams have a big run of rainbow at spawning time and afford excellent fishing. Steelhead and salmon run up both Deer and Battle creeks from the Sacramento River at spawning time. In both streams there is a high falls that keeps them from reaching the headwaters. However, it might be advantageous to blast out these falls. During the early eruptions of Mount Lassen and the subsequent flood all of the trout in Hat Creek were either washed away or killed. For the past several years there have been practically no fish in the creek. The stream is now becoming clearer, however, and the fish are beginning to appear again. The waters of this stream are largely used for irrigation and the residents prefer not to have the stream stocked so that they will not be compelled to put in fish screens.

REPORTS.

CALIFORNIA FRESH FISHERY PRODUCTS, JANUARY, FEBRUARY AND MARCH, 1920.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Tehama, Colusa, Glenn	Contra Costa, Alameda	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Imperial	Total	Mexican
Albacore								225		19,391		3,325				3,325	
Anchovies								61	221		39,378	4,572		136,241		24,188	
Barracuda									107	16,501		234,759				430,060	1,740,664
Bluefish	334							85,755	157,025	272,434						16,008	
Bocaccio											1,368	50,680	2,432	18,210		515,548	
Bonito				2,297	49,805		21,037	224					5,230			78,600	139,000
Carp	97	16,244		4,645	13,025											78,743	
Catfish								56,278	73,607	3,101						34,011	
Chilepepper								156,205	31,478	68,933	365					132,986	
Cultus cod	291		31				864	131,796	13,775	42	800	1,469				258,162	
Flounders	3,961		255	3,682			818			220	300	108,823		17,077		156,398	
Grayfish			160				15	95,080								221,675	12,628
Greenfish												412				412	
Hake								10,700			52,070	544,058	75,062	287,476		10,700	
Halibut	1,350							14,062	9,905	351						984,334	352,393
Hardhead				10,951			55									11,006	
Herring	3,836		65,470				38,120	115,090		15,811	33	153,903	161	2,502		225,516	
Kingfish			8					1,108	16,566	24,172	1,226	306,882	593	23,907		190,152	
Mackerel														11,525	4,496		
Mullet											180	8,815	317	135		16,021	
Perch	17,306		11,727	40			265	11,773	875	8,625						60,059	290
Pike				55	931		2,843									3,889	
Pompano								24		570		10,613		58		11,565	231
Rock bass											60	8,155	905			11,912	630
Rockfish	5,664		84					245,664	80,866	165,292	45,575	525,795	4,479	335,721		1,459,100	83,929
Sablefish								346,418	1,625							350,565	
Salmon	818		759	78,223	21,170	2,461	71,125	16,097	119	146,939						337,711	
Sanddab								307,775	7,096	476	25	2,198				217,490	

Sardines				644,316	1,385,900	21,472,739	24,537,871	378	7,642,187	55,683,391	3,185
Sculpin							4,714	65	989	5,768	
Sea bass (black)							11,025	110	14,994	26,120	27,218
Sea bass (white)							395,172	467	6,039	403,206	47,159
Sea trout	54			387	15	29	1,697		5,689	6,787	5,562
Shad										19,710	
Shad (black)				1,360						39,265	
Shad (roe)				12,021						36,542	
Shad (roe)				22,731						8,900	
Sheepshead				21,886						43,160	
Skates							91	73	7,099		
Skipjack				39,060	1,625		1,737		65	445	
Smelt	15,625	245	20,434						11,111	188,162	39
Sole	302			51,544	152	18,550	35,412	4,672	1,741	1,076,392	
Spittail				982,340	51,276	1,751	2,778	269		12,075	
Striped bass						17				184,224	24,885
Stingaree										1,568	
Suckers				29,706					24	24	
Swordfish										20,505	
Tomcod				20,457			1,395			1,395	
Tuna				34						474	
Turbot				34						68	
Whitebait							1,574		3,207	4,781	4,417
Whitefish							258,195	195	18,582	276,902	68,838
Yellowtail								287	2,900		680
Miscellaneous				12,556	1,258	3,850	61,927				
Total fish	52,638	16,459	101,770	3,276,695	1,833,356	22,242,616	27,277,462	55,545	8,000,816	64,322,334	2,544,039
Crustaceans—											
Crabs (doz.)	1,385		280	23,499	202	7	171			25,380	
Shrimps				182,725			61,902	7,160	11,140	182,896	
Spiny lobsters										87,851	316,956
Mollusks—											
Abalones	225	10	475							43,450	29,950
Clams (cockle)	4,115		1,708							9,311	
Clams (mixed)	5,623		11,289							18,290	18,500
Clams (Pismo)				1,304	125		72,802	20		72,937	
Clams (softshell)	396	3,469	1,540	2,301						30,401	
Cuttlefish			64	5,093	3,375	23,895	351			32,778	
Limpets								535		535	
Mussels				2,289	1,000		292	1,603		6,181	

CALIFORNIA FRESH FISHERY PRODUCTS—Continued.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake.	Marin	Solano, Yolo	Sacramento, San Joaquin	Tehama, Colusa, Glenn	Contra Costa, Alameda	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego	Imperial	Total	Mexican
Oysters, Eastern (number)			306,702					1,143,750								1,450,452	
Oysters, native			14,630													14,630	
Snails																280	
Squid	90									247,544		280				382,730	
Miscellaneous—												135,122					
Turtles																	2,180
Scallops																513	

All amounts shown in pounds unless otherwise specified.

CORRECTION.—In the April issue of CALIFORNIA FISH AND GAME was shown a report of California fresh fishery products for the year 1919, and on page 94, amounts of sanddab and sardines shown for Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange and San Diego counties were transposed. Amounts shown for Marin, San Francisco and San Mateo counties were correct. Below is shown the correct amounts of sanddab and sardine taken in California during 1919.

District	Sanddab	Sardine
Marin		141,700
San Francisco and San Mateo	628,206	1,362,518
Santa Cruz	67,885	5,141,809
Monterey	2,692	81,447,280
San Luis Obispo, Santa Barbara and Ventura	1,394	54
Los Angeles	7,830	54,600 1/4
Orange		25
San Diego	1,821	11,183,539
Totals	709,738	153,877,179

VIOLATIONS OF FISH AND GAME LAWS.

January 1 to March 31, 1920.

Offense	Number of arrests	Fines imposed
Game.		
Hunting without license.....	24	\$420 00
Trapping without license.....	5	45 00
Trapping on game refuge.....	1	100 00
Deer—close season—killing or possession.....	9	540 00
Female deer—spike bucks—fawns—killing or possession.....	2	100 00
Running deer with dogs—close season.....	2	50 00
Illegal deer hides—possession.....	2	90 00
Beaver—beaver hides—killing or possession.....	2	125 00
Quail—closed season—killing or possession.....	3	75 00
Quail in captivity without permit.....	1	10 00
Ducks—excess daily limit—close season—killing or possession.....	9	625 00
Shooting ducks from power boat in motion.....	8	120 00
Night shooting.....	17	625 00
Doves—close season—killing or possession.....	1	5 00
Swan—killing or possession.....	4	175 00
Pheasant—killing or possession.....	1	20 00
Protected shore birds—killing or possession.....	4	85 00
Nongame birds—killing or possession.....	5	55 00
Tree squirrels—closed season—killing or possession.....	4	75 00
Total game violations.....	104	\$3,340 00
Fish.		
Angling without license.....	10	\$235 00
Fishing for profit without license.....	6	125 00
Making false statement on application.....	1	25 00
Striped bass—underweight—close season.....	4	45 00
Halibut—underweight—offering for sale.....	7	155 00
Barracuda—underweight—offering for sale.....	1	—
Trout—excess limit—offering for sale—closed season.....	8	250 00
Lobsters, dried—under or oversized—closed season.....	15	321 00
Crabs—undersized—closed season.....	4	40 00
Abalones—red, black and green—under or oversized.....	33	670 00
Clams—undersized—excess limit.....	11	260 00
Dynamiting fish.....	2	—
Seining in restricted waters.....	3	600 00
Seining within 750 feet of Redondo Pier.....	6	650 00
*Seining within one mile of Los Angeles city sewer.....	3	300 00
Pollution of state waters.....	1	200 00
Total fish violations.....	115	\$3,876 00
Grand total fish and game violations.....	219	\$7,216 00

*Paid into Los Angeles County treasury.

SEIZURES—FISH AND GAME AND ILLEGALLY USED FISHING APPARATUS.

January 1, 1920, to March 31, 1920.

Game.		Fish.	
Deer meat	298 pounds	Halibut	2,658 pounds
Ducks	780	Barracuda	200 pounds
Gray geese	17	Striped bass	574 pounds
Rabbits	70	Catfish	50 pounds
Live quail	6	Trout	65
Miscellaneous birds	4	Crabs	1,143
Deer hides	13	Lobsters	955
		Lobsters (dried)	131 pounds
		Abalones	609 pounds
		Pismo clams	566
		Cockle clams	1,275 pounds
		Little Neck clams	220 pounds
		Illegal nets	5
		Searches.	
		Illegal fish and game	3

Fish and Game Commission

STATEMENT OF EXPENDITURES.

For the Period July 1, 1919, to April 30, 1920.

Administration:			
Commissioners		\$1,400	84
Executive offices		22,031	42
Research and publicity		4,188	23
Accident and death claims		1,902	31
			\$32,979 32
Commercial fish culture and conservation:			
Superintendence		\$11,105	57
Inspection and patrol		25,051	65
Research		15,055	73
Statistics		8,153	41
Market fishing license commissions		695	00
Propagation and distribution of salmon		19,498	83
			79,560 22
Sporting fish culture and conservation:			
Superintendence		\$12,102	31
Printing		1,864	69
Prosecutions and allowances		404	55
Angling license commissions		11,765	70
Special field investigation		252	35
Fish exhibits		7,205	91
General patrol (pro rata share)—			
San Francisco District (40 per cent)		28,780	33
Los Angeles District (40 per cent)		11,540	18
Sacramento District (40 per cent)		22,826	26
Propagation and distribution of trout		101,218	84
			197,964 12
Game conservation:			
Printing		\$2,746	76
Prosecutions and allowances		1,180	60
Hunting license commissions		17,952	90
Mountain lion hunting (and bounties)		6,062	48
General patrol (pro rata share)—			
San Francisco District (60 per cent)		43,161	57
Los Angeles District (60 per cent)		17,310	30
Sacramento District (60 per cent)		34,404	45
			122,819 03
Tahoe camping ground			2,964 39
Total expenditures			\$436,287 11